

Report 10352A
August 1995

GENCORP
AEROJET

**Earth Observing System (EOS)
Advanced Microwave Sounding Unit-A (AMSU-A)
FIRMWARE TEST PLAN**

**Contract No: NAS 5-32314
CDRL: 033**

Submitted to:

**National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771**

Submitted by:

**Aerojet
1100 West Hollyvale Street
Azusa, California 91702**

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Section 1

INTRODUCTION

1.1 Identification

This is the *Firmware Test Plan* (FTP) for the software being developed and embedded in Programmable Read Only Memory (PROM) to be used in the Earth Observing System (EOS) Advanced Microwave Sounding Unit-A (AMSU-A) system. This document is submitted in response to Contract NAS 5-32314 as CDRL 033 and in accordance with Data Item Description (DID) DI-MCCR-80014A and NASA-DID-999. This document applies to the following Computer Software Configuration Items (CSCI):

Instrument Control Firmware, EOS/AMSU-A1	CSCI No. N7
Command and Data Handling Firmware, EOS/AMSU-A1 and A2	CSCI No. N8
Instrument Control Firmware, EOS/AMSU-A2	CSCI No. N11

1.2 Scope

This document defines the formal qualification tests required for the embedded flight software for the two instrument modules AMSU-A1 and AMSU-A2.

1.3 Purpose and Objectives

The purpose of the Firmware Test Plan is to describe the test environment, test objectives, schedule and data recording and analysis for the EOS/AMSU-A firmware formal qualification tests.

1.4 Document Status and Schedule

This is the third submittal of the EOS/AMSU-A Firmware Test Plan, updated for the Critical Design Review (CDR).

1.5 Document Organization

This document contains the following information as required by Contract Data Requirements List (CDRL) 033 and Data Item Description (DID) DI-MCCR-80014A except for paragraphs 1 and 2 which are prepared in accordance with NASA-DID-999, per agreement with the NASA project office.

Section 1 - This section identifies the EOS/AMSU-A software and contains a brief overview of the CSCI and this document.

Section 2 - This section contains a list of applicable documents.

Section 3 - This section provides a description of the software test environment. This includes hardware, software, and firmware necessary to perform formal qualification testing.

Section 4 - This section identifies each formal qualification test with a description of the formal qualification test requirements for the CSCI. It also includes the test schedule.

Section 5 - This section describes the data reduction and analysis procedure to be used during and following the tests identified in this FTP. This includes the methods for retention of the information resulting from data reduction and analysis.

Section 6 - This section provides an alphabetical listing of acronyms and abbreviations used in this FTP.

Appendix A – Appendix A provides tables for cross-referencing SRS requirements with test plan paragraphs.

The EOS/AMSU-A Software Documentation Tree is as shown in Figure 1.

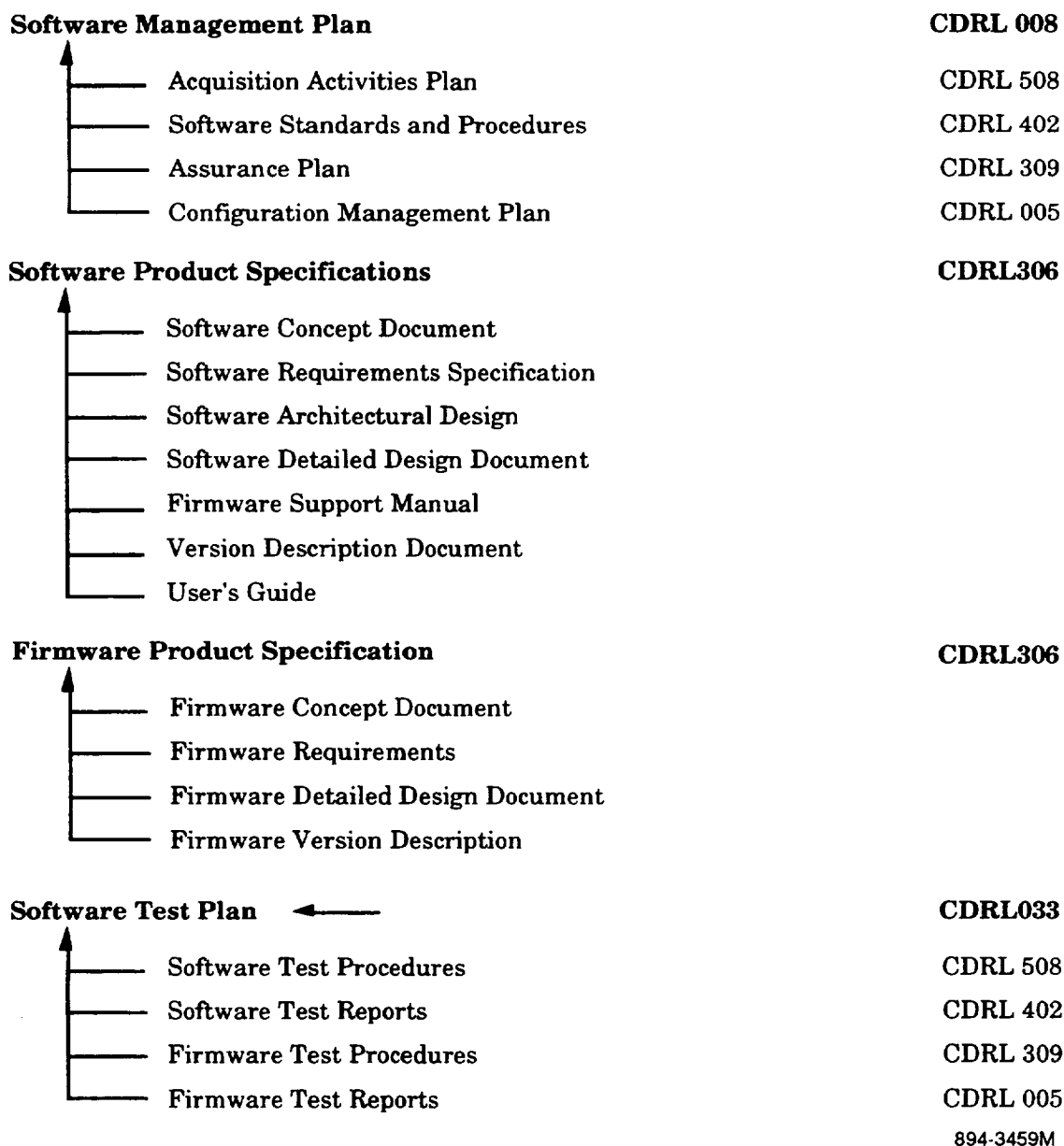


Figure 1 EOS/AMSU-A Software Documentation Tree

Section 2

RELATED DOCUMENTATION

2.1 Parent Documents

None.

2.2 Applicable Documents

The following documents are referenced or applicable to this report. Unless otherwise specified, the latest issue is in effect.

Military

MIL-STD-1553	Digital Time Division Command/Response Multiplex Data
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National Aeronautics and Space Administration

DI-MCCR-80014A	Software Test Plan Data Item Description
GSFC 422-12-12-0	Performance and Operation Specification for the AMSU-A EOS PM Project
GSFC 422-10-04	Earth Observing System (EOS) Instrument Project Software Acquisition Management Plan
NASA-DID-999	Template

Aerojet

AE-26581	Software Assurance Plan NASA EOS/AMSU-A CDRL (309)
AE-26600	SRS for the EOS/AMSU-A1 and A2 Firmware

(Copies of Aerojet documents may be obtained from Aerojet, P.O. Box 296, Azusa, CA 91702, ATTN: Data Center)

2.3 Information Documents

None.

Section 3

SOFTWARE TEST ENVIRONMENT

The following subsections identify and describe the plans for implementing and controlling the resources (software, firmware, and hardware) necessary to perform formal qualification testing of the EOS/AMSU-A software. The software test environment is illustrated in Figure 2.

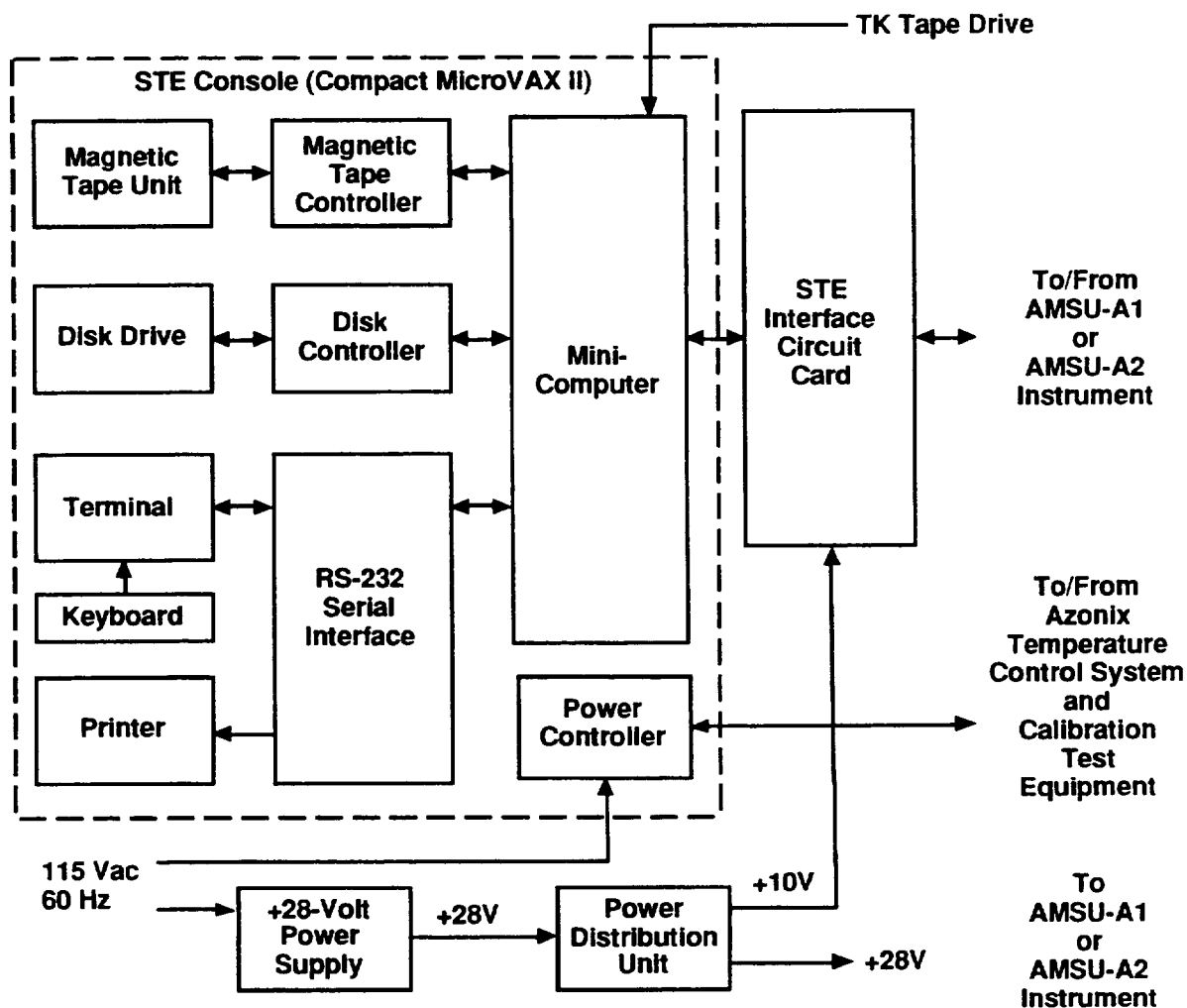


Figure 2 Software Test Environment

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3.1 Software Items

The software items to be used to perform formal testing of the EOS/AMSU-A firmware are as follows. No software other than the software identified below and software developed as test drivers will be used to test the EOS/AMSU-A firmware.

3.1.1 Subsystem 1 Software Items

The software items to be used in the firmware test environment during formal qualification testing are:

Item Description

Operating system
Compiler
Test data drivers
Test data generators

3.2 Hardware and Firmware Items

The hardware and firmware items to be used to perform formal testing of the EOS/AMSU-A firmware are identified below.

3.2.1 Subsystem 1 Hardware and Firmware Items

The hardware and firmware items to be used in the software test environment during formal qualification testing are:

Item Description

Purpose

Special Test Equipment
Micro Vax Computer

Provides hardware test environment for the CSCI
under test

AMSU-A Signal Processor
breadboard and test set

Provides data input and response to commands

3.3 Proprietary Nature and Government Rights

The data rights for all deliverable software and documentation developed by Aerojet for the EOS/AMSU-A project is provided to NASA without restriction. Commercial-off-the-shelf (COTS) software delivered as part of the EOS/AMSU-A CSCI, however, is provided with vendor restrictions maintained.

3.4 Installation, Testing, and Control

The installation and test of the commercial-off-the-shelf software used during the testing of the CSCI will be per standard procedures for each product. Standard commercial practices will be followed for control of the test environment during formal qualification testing. Configuration management practices defined in the EOS/AMSU-A Configuration Management Plan will be followed for all CSCI. Directory listings will be run at beginning of testing to show date and time stamp of each module.

Section 4

FORMAL QUALIFICATION TEST IDENTIFICATION

4.1 Instrument Control Firmware, EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11

The overall firmware test process will be conducted by Software Engineering and Quality Assurance as shown in Figure 3.

4.1.1 General Test Requirements

Formal Qualification Test (FQT) will serve as the mechanism by which the EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11 are formally verified to meet the functional, performance, and interface requirements specified in the SRS, AE-26600. These CSCI are classified as Mission/Science Critical Heritage software, whose failure would cause permanent reduction in EOS capability. This software will be verified and validated throughout the life cycle in accordance with the Software Management Plan. This software is defined as Category 1 software within the Aerojet Software Development Standards and Procedures guidelines. An independent team is required to conduct Verification and Validation. The software (firmware) products will be subject to quality assurance review by Aerojet Software Quality Assurance. Independent personnel are defined as individuals not directly involved in the design or implementation of the software. CSCI-N7 (EOS/AMSU-A1) and CSCI-N11 (EOS/AMSU-A2) are identical in function, operation and capabilities. They differ only in the number of sensor channels and housekeeping data elements. Therefore the tests for these CSCI will be identical. The following general requirements apply to all formal qualification tests.

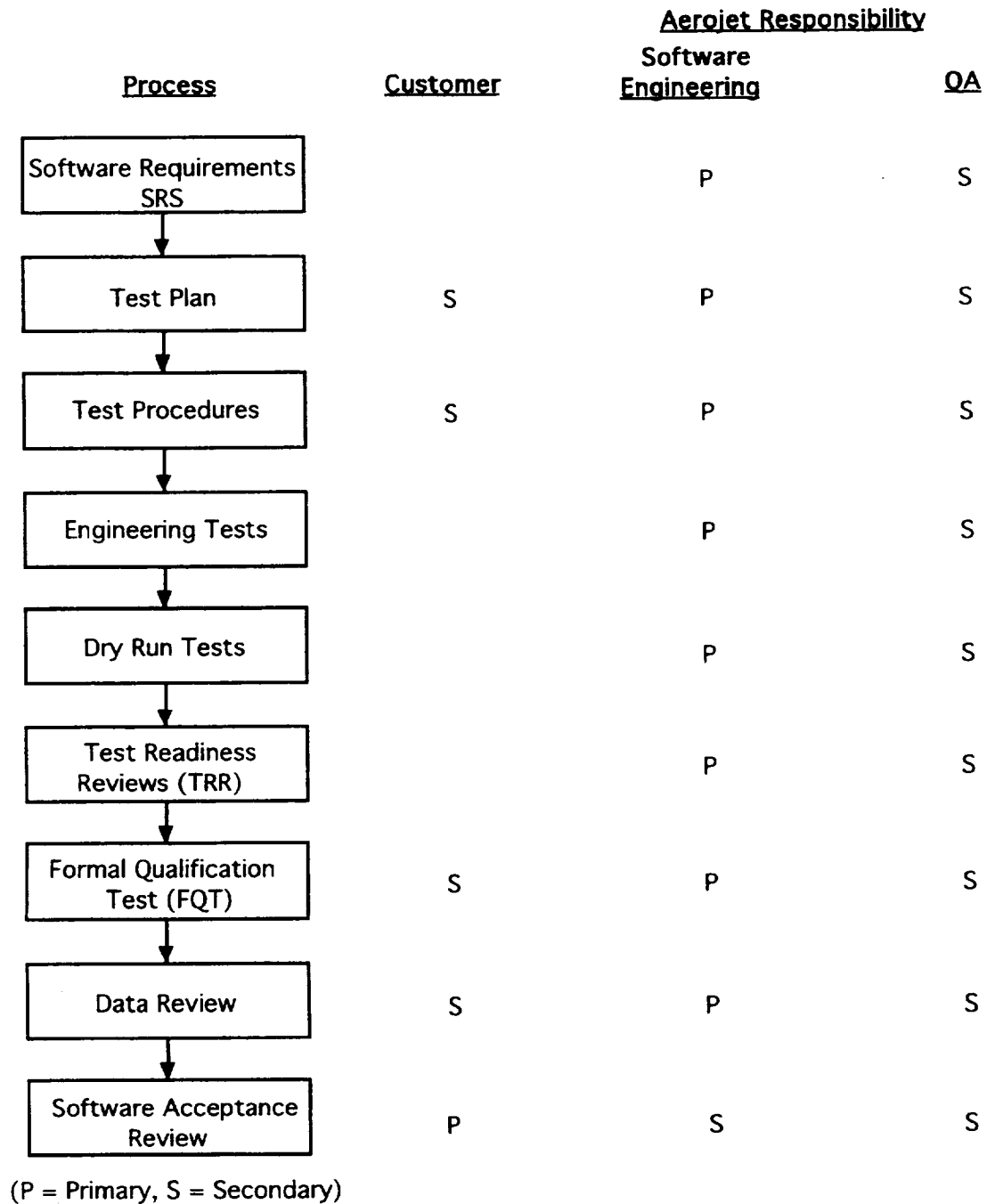
- a. Each test must verify correct implementation of the identified set of requirements using nominal conditions
- b. Each test must verify compliance with the resource utilization requirements specified in paragraph 3.6 of the SRS.

4.1.1.1 Qualification Test Performance

The performance of the formal qualification tests will include the following:

- a. Performance by an independent test team
- b. Performance with rigid controls on the software configuration
- c. Formal documentation with controlled test plans and procedures
- d. Customer review and approval of the test plan
- e. Aerojet Quality Assurance review and audit of all aspects of formal testing
- f. A test verification matrix to provide traceability from the software specification requirements to the test plans and procedures

These tests will provide adequate data for assessment of the EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11 capability to meet the specified requirements.



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Figure 3 Software Test Process and Responsibility

At the end of each formal qualification test (FQT), the formal test data, discrepancy reports, and corrective actions will be reviewed. Formal qualification testing of the EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11 is complete after it is demonstrated that the software (firmware) meets all requirements as specified in the SRS as verified during the test data review held after each FQT is conducted.

Appendix A of this test plan contains the CSCI qualification matrix which relates each SRS requirement paragraph number to a particular test method. This ensures that each requirement is tested, that every test satisfies one or more requirements, and that definitive acceptance criteria are established. Appendix A also provides a cross reference matrix that provides a list of qualification tests and the SRS requirements satisfied by each test.

Detailed Software Test Procedure documents which identify and describe the test cases for the formal qualification tests described in this test plan will be prepared. The test procedures will include set-up procedures, procedures for conducting each test, procedures for analyzing the test results, and what test drivers and supporting software are required. QA personnel perform an auditing, evaluating, and monitoring role during testing and, when the test is completed, keep certified test history documents (i.e., as-run test procedures, test deficiencies, and test results). The test procedures will be reviewed during engineering dry runs to check the validity of the test, to verify the applicability of the procedures, and to identify potential software problems. A quality assurance dry run will be conducted after the engineering dry runs are completed and procedures have been updated, to verify readiness to conduct a formal qualification test. Results from the qualification test dry runs will be presented and discussed at the Test Readiness Review (TRR) to be held approximately 30 days prior to formal test.

The testing will be conducted by a test team consisting of one or more members dedicated to the test function, personnel from design and development groups, systems engineering, and a QA representative.

Problems encountered during testing (either quality assurance dry runs or subsequent formal testing) will be documented in a Software Discrepancy Report (SDR). Each SDR will be reviewed by Aerojet Systems Engineering and provided to the cognizant software engineer to determine discrepancy cause and appropriate corrective action required. All resulting software changes or corrections in documentation, will be made by design and development personnel. Each SDR will have a matching Software Change Request attached when applicable. Software Change Requests for Class I changes will be submitted to the NASA EOS PM Project for approval and Class II changes will be submitted for concurrence with change classification.

Design and development personnel will make all software modifications and will retest the modified software to the extent necessary to ensure that it operates correctly and has not affected other software elements. The modified software will then be returned for continued qualification testing and regression testing as required. All changes in the software specifications or test procedures are subject to configuration control. Source media and documentation will be under QA bond and control from the start of formal qualification testing.

The software requirements will be qualified by a combination of capability tests, and performance tests. Stress tests and anomalous condition tests will be included.

4.1.1.1.1 Capability Tests

Capability tests will be performed to provide verification of requirements at the capability level of the completely integrated CSCI. These tests are oriented toward verifying proper performance of each capability and as such may not exercise the complete CSCI in an end-to-end fashion, but concentrate on the specific capability in question. This includes verification of all external and internal interfaces for each of the capabilities as applicable. The software will be tested in all modes, if these modes differ for the capability under verification.

4.1.1.1.2 Performance Tests

Performance tests will be performed to test the completely integrated CSCI in an end-to-end fashion utilizing realistic input data gathered from previous tests.

4.1.1.2 Test Objectives

The general objectives of the test activity is to:

- a. Verify all software requirements.
- b. Identify software problems
- c. Provide the environment in which to test software corrections and dry-run formal tests
- d. Verify correct implementation of algorithms
- e. Provide evaluation of software performance
- f. Perform formal tests and demonstrations
- g. Collect test data for analysis and evaluation to determine if specific test requirements are satisfied

4.1.1.3 Test Methods

The test methods will consist of one or a combination of the following:

- a. Inspection is an element of verification consisting of investigation, without the use of special laboratory appliances or procedures, to determine conformance to those specified requirements that can be determined by such investigations. Inspection is generally non-destructive and includes, but is not limited to visual, auditory, simple physical manipulation, gauging, and measurement.
- b. Demonstration is an element of verification denoting the determination of properties or elements of the CSCI (or program element thereof) by technical means, including functional operations or measurements, and application of established principles and procedures.
- c. Analysis is an element of verification in the form of a study resulting in data, that is intended to verify a requirement, when inspection or demonstration cannot feasibly be employed to verify that requirement, at the verification level demanded by the specification. Such data may be formed by compilation of interpretation of existing data or design solutions, or be derived from original lower level inspections, or both. Data may be interpolated or extrapolated as applicable. This method would include data derived from failure modes and effects analysis.

4.1.1.4 Qualification Test Implementation

The Aerojet test personnel will be responsible for administration of all Aerojet testing. The test director will be responsible for conducting the formal test which consists of a pre-test briefing, the test run, a post-test briefing, and a data review. The test director will have the authority to make changes in test procedures and the scheduling of required test equipment and personnel. The test personnel will be an independent team, i.e., individuals not involved in the design or implementation of the firmware.

Pre-test briefings provide information on tests to be executed, data to be used, procedures involved, duties of active testing participants, and test results expected. Post test briefings will provide the test results obtained and report on discrepancy reports that may have been gathered during the test.

If a failure or anomalous condition occurs during testing, an SDR will be initiated. The SDR identifies the test run and the discrepant condition. All SDR are kept, logged, and tracked by the Aerojet Quality Assurance department. A copy of all SDR generated during the test will be included in the final test report.

The test team will determine the effect of the anomaly or failure on the credibility of the tests and, if necessary, rerun the affected portion(s). If the cause of the failure cannot be determined, additional testing of the failing portion of the tests will be deferred pending resolution of the problem. Complete records of all deficiencies, corrective actions, and retests will be maintained and be available for inspection.

Upon completion of testing, the test results will be labeled and dated to identify the test and date of the test runs. All of the test results including tapes, printouts, listings, disks and a copy of all SDR will be maintained by the Aerojet test personnel, under Aerojet Quality Assurance and Configuration Management Control.

4.1.1.5 Personnel Requirements

The personnel required for the test effort and function of each are as follows:

- a. Test director – schedule time for testing purposes; conduct test runs as specified in the test procedures during testing periods; maintain documentation related to the testing; and maintain testing status information. Additional functions included providing the test report summary after testing is complete, and supply and maintain any other test-related documentation.
- b. Software Quality Assurance – ensure that the tested software is bonded and managed under the procedures established by the Aerojet Software Quality Assurance and Configuration Management departments; monitor test documentation efforts; participate in qualification testing and verify initiation, processing, and closure of SDR per the Software Assurance Plan and Procedures.
- c. Software Engineering – provide technical assistance as needed in the functions undergoing test during all qualification test periods.
- d. Systems Engineering – provide assistance as needed during data reduction and analysis.
- e. Customer or designated representative – monitor the development of the qualification testing effort, witness the formal qualification tests and verify documentation of any deviation from the test objectives by generation of SDR.

4.1.2 Test Classes

The formal test classes are divided into the following:

- a. Capability tests – Test specific capability functions and interfaces
- b. Performance tests – Demonstrations.

4.1.3 Test Levels

The following levels of FQT test have been defined for the EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11.

- a. CSC level – To evaluate compliance with Computer Software Component requirements specified in the SRS at the CSC level
- b. CSCI level – To evaluate compliance with requirements specified in the SRS at the CSCI level
- c. CSCI to CSCI integration level – external interfaces
- d. CSCI to Hardware Configuration Item integration level – external interfaces
- e. System level – System-level tests are defined as tests utilizing data which evaluate the system performance in terms of system-level requirements as specified in Appendix A of the SRS.

4.1.4 Test Definitions

The following subparagraphs identify and describe each formal qualification test to be conducted on the Instrument Control Firmware, EOS/AMSU-A1 CSCI-N7 and EOS/AMSU-A2 CSCI-N11. The objective of this qualification test is to verify the following functions of the Instrument Control Firmware for the A1 and A2 instruments.

- a. Read and Interpret Commands
- b. Control Instrument Power – on/off/standby/orderly shutdown
- c. Operate Scanner – Fullscan/Warm CAL/Cold CAL/NADIR/GSE mode
- d. Output Data Header – Sync/ID#/Housekeeping Data
- e. Format and Output Sensor Data – Including Antenna Position
- f. Evaluate Antenna Position Error and Output Error Code

4.1.4.1 Executive Functions Test - N7_FQT100 and N11_FQT100

- | | |
|--------------------------|---|
| a. Test Objective: | Verify that the Executive Capability provides a minimum operating system which controls the sequence of operations occurring in the subsystem as it provides for scheduling of processors, maintains timing of events, and provides for the transfer of information between capabilities within the CSCI. |
| b. Special Requirements: | None |
| c. Test Level: | CSCI |
| d. Test Class: | Capability |
| e. Qualification Method: | Demonstration |

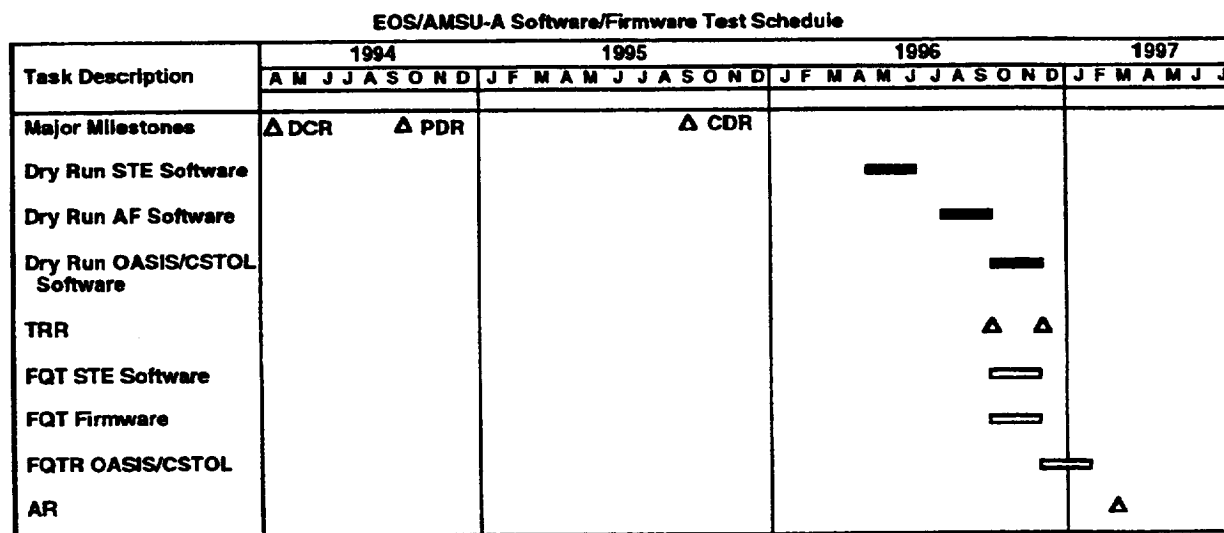
- f. SRS References: Appendix A
- g. Type of Data to be Recorded: Input data files and logged output data files
- h. Assumptions and Constraints: None

4.1.4.2 Event Driven Functions Test - N7_FQT200 and N11_FQT200

- a. Test Objective: Verify the Event driven capabilities
- b. Special Requirements: None
- c. Test Level: CSCI
- d. Test Class: Capability
- e. Qualification Method: Demonstration
- f. SRS References: Appendix A
- g. Type of Data to be Recorded: Input data files and logged output data files
- h. Assumptions and Constraints: None

4.1.5 Test Schedule

All of the tests identified in 4.1.4 will be conducted during formal qualification testing as illustrated in the schedule illustrated in Figure 4.



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Figure 4 Test Schedule

4.2 Command and Control Handling Firmware, EOS/AMSU-A1 And A2 CSCI-N8

4.2.1 General Test Requirements

Formal Qualification Test (FQT) will serve as the mechanism by which the EOS/AMSU-A1 and A2 CSCI-N8 is formally verified to meet the functional, performance, and interface requirements specified in the SRS, AE-26600. This CSCI is classified as Mission/Science Critical Developed software, whose failure would cause permanent reduction in EOS capability. This software will be verified and validated throughout the life cycle in accordance with the Software Management Plan. This software is defined as Category 1 software within the Aerojet Software Development Standards and Procedures guidelines. An independent team is required to conduct Verification and Validation. The software (firmware) products will be subject to quality assurance review by Aerojet Software Quality Assurance. Independent personnel are defined as individuals not directly involved in the design or implementation of the software. The following general requirements apply to all formal qualification tests.

- a. Each test must verify correct implementation of the identified set of requirements using nominal conditions.
- b. Each test must verify compliance with the resource utilization requirements specified in 3.6 of the SRS.

See 4.1.1 for additional test requirements.

4.2.2 Test Classes

The formal test classes are divided into the following:

- a. Capability tests – Test specific capability functions and interfaces
- b. Performance tests – Demonstrations

4.2.3 Test Levels

The following levels of FQT test have been defined for the EOS/AMSU-A1 and A2 CSCI-N8.

- a. CSC level – To evaluate compliance with CSC requirements specified in the SRS at the CSC level
- b. CSCI level – To evaluate compliance with requirements specified in the SRS at the CSCI level
- c. CSCI to CSCI integration level – external interfaces
- d. CSCI to HWCI integration level – external interfaces
- e. System level System – level tests are defined as tests utilizing data which evaluate the system performance in terms of system-level requirements as specified in Appendix A of the SRS.

4.2.4 Test Definitions

The following subparagraphs identify and describe each formal qualification test to be conducted on the EOS/AMSU-A1 and A2 CSCI-N8. The objective of this qualification test is to verify the following functions of the Command and Data Handling Firmware for the A1 and A2 instruments.

- a. Process Input Commands – Reformat for existing system
- b. Process Time Data Sync Input
- c. Format Sensor Data into MIL-STD-1553 Data Packets
- d. Perform Data Parity Check
- e. Append Special Header to Data Block
- f. Include Time in Output Data Block

4.2.4.1 Executive Functions Test - N8_FQT100

- a. Test Objective: Verify that the Executive Capability provides a minimum operating system which controls the sequence of operations occurring in the subsystem as it provides for scheduling of processors, maintains timing of events, and provides for the transfer of information between capabilities within the CSCI.
- b. Special Requirements: None
- c. Test Level: CSCI
- d. Test Class: Capability
- e. Qualification Method: Demonstration
- f. SRS References: Appendix A
- g. Type of Data to be Recorded: Input data files and logged output data files.
- h. Assumptions and Constraints: None

4.2.4.2 Event Driven Functions Test - N8_FQT200

- a. Test Objective: Verify the Event driven capabilities
- b. Special Requirements: None
- c. Test Level: CSCI
- d. Test Class: Capability
- e. Qualification Method: Demonstration
- f. SRS References: Appendix A
- g. Type of Data to be Recorded: Input data files and logged output data files
- h. Assumptions and Constraints: None

4.2.5 Test Schedule

All of the tests identified in 4.2.4 will be conducted during formal qualification testing as illustrated in Figure 4.

Section 5

DATA RECORDING, REDUCTIONS, AND ANALYSIS

5.1 Data Recording

The Aerojet Quality Assurance group will verify that the formal testing has been conducted, controlled, and documented in accordance with the test procedures. The complete set of test documentation (test procedures, test variances, test results, etc.) for formal tests will be kept in the Software Development Library (SDL). Test materials kept within the SDL will include the following:

- a. Test Outputs – Where test outputs can be captured into a file, these outputs will be included as part of the test materials; otherwise textual summaries will be included.
- b. Test Inputs – Where test inputs can be captured into a file, these inputs will be included as part of the test materials; otherwise textual summaries will be included.
- c. Copies of all formal software test documents will also be maintained in the SDL.

5.2 Data Reduction and Analysis

Reduction and analysis of the recorded data will be accomplished using both computer-aided and manual methods. In many cases the captured test results will be compared manually to the expected test results. In cases where such manual comparison may be too time consuming, computer utilities will be used which examine two files of data (in this case an expected results file and the test results file) and report any differences that exist between them.

5.3 Test Output Analysis

All software generated test outputs will be evaluated according to the following criteria:

- a. Correctness – Test outputs will be analyzed and compared against "truth data" to ensure that they meet the requirements specified in the SRS, AE-26600.
- b. Format – Test outputs which are to be provided to an external interface as defined in the Interface Requirements Specification (included in an appendix of the SRS) will be analyzed to ensure exact compliance with the interface format.

5.4 Test Documentation

The formal testing of the software will be completed when all of the tests described in this document have been conducted and the test materials have been analyzed to verify that the test results meet all of the above criteria. The test team will use Software Discrepancy Reports and Software Change Request (SCR) forms to document anomalies encountered during the conduct of QA dry runs, FQT, and data reviews. A Test History Log will be used to record all of the chronological events pertinent to formal testing. Other test history documents such as As-run Test Procedures, SDRs, SCRs, and test results will be maintained. The following documents will be distributed at the completion of formal test:

- a. Software Change Requests/Software Discrepancy Reports
- b. Test History Logs
- c. Test History Documents
- d. Redlines to the test procedures
- e. Software Test Report.

The Software Test Report will be written for the tests listed after data reduction and analysis of the individual test results has been performed.

Section 6

NOTES

This section contains general information that aids in understanding this document. It includes an alphabetical listing of all acronyms, abbreviations, and their meanings as used in this document.

6.1 Acronyms and Abbreviations

AMSU	Advanced Microwave Sounding Unit
CDRL	Contract Data Requirements List
CDR	Critical Design Review
CM	Configuration Management
COTS	Commercial Off The Shelf
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
DCR	Design Concept Review
DID	Data Item Description
EOS	Earth Observing System
FQT	Formal Qualification Test
FTP	Firmware Test Plan
HWCI	Hardware Configuration Item
IRS	Interface Requirements Specification
NASA	National Aeronautics and Space Administration
PDR	Preliminary Design Review
PROM	Programmable Read Only Memory
QA	Quality Assurance
SCR	Software Change Request
SDL	Software Development Library
SDR	Software Discrepancy Report
SQA	Software Quality Assurance
SAP	Software Assurance Plan
SRS	Software Requirements Specification
STE	Software Test Environment
STR	Software Test Report
TRR	Test Readiness Review

APPENDIX A

QUALIFICATION CROSS-REFERENCE

1.0 Qualification Cross Reference

Table A-I is the requirements qualification matrix and cross-reference matrix to be completed upon completion of the SRS. Table A-I relates each requirement in the Software Requirement Specification to the qualification tests listed in Section 4 of this document.

Table A-I CSCI Qualification Matrix

SRS AE-26600 Paragraph No.	Paragraph Title	Test Method
5.1.1.1	Sensor Data	D, I
5.1.1.2	Calibration Test Equipment Data	D, I
5.1.2.1	Sensor Transactions	D, I
5.1.2.2	CTE Transactions	D, I
5.1.3.1	Display Data on Video Terminal	D
5.1.3.2	Output Commands to Sensor	D
5.1.3.3	Output Commands to Azonix	D
5.1.3.4	Output Commands to CTE	D
5.1.3.5	Output Commands to System Disk	D
5.1.3.6	Output Commands to Tape	D
5.1.3.7	Output Commands to Line Printer	D
5.2.1.1	Timing and Sizing Requirements	I
5.2.1.2	Sequence and Timing of Events	A
5.2.1.3	Throughput and Capacity	A
5.2.2.1	Error Detection and Isolation	D
5.2.2.2	Error Recovery	D
5.2.3.1	Reliability	A
5.2.3.2	Maintainability and Portability	N/A
5.3	Safety	N/A
5.4	Security and Privacy	N/A
Legend: D Demonstration A Analysis I Inspection N/A Not Applicable		

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
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4. TITLE AND SUBTITLE Earth Observing System/Advanced Microwave Sounding Unit (EOS/AMSU-A), Firmware Test Plan			5. FUNDING NUMBERS NAS 5-32314	
6. AUTHOR(S) Robert Schwantje				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702			8. PERFORMING ORGANIZATION REPORT NUMBER CDRL 033 10352A August 1995	
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11. SUPPLEMENTARY NOTES ---				
12a. DISTRIBUTION/AVAILABILITY STATEMENT ---			12b. DISTRIBUTION CODE ---	
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